Listing of Claims

Claims 1-29 (canceled)

30. (previously presented) A system for visualizing multi-dimensional pattern data reduced to a lower-dimension representation, comprising:

a neural network having an input layer and an other layer, wherein a number of nodes in the other layer is less than a number of input nodes in the input layer, and the other layer supplies an output signal corresponding to multi-dimensional pattern data received by the input layer; and

a training module for the neural network, wherein the training module includes means for equalizing and orthogonalizing the output signal of the other layer.

31. (previously presented) The system of claim 1, wherein the training module equalizes and orthogonalizes the output signal of the other layer by constraining values of a covariance matrix of the output signal.

32. (previously presented) The system of claim 1, wherein the training module equalizes and orthogonalizes the output signal of the other layer by reducing a covariance matrix of the output signal to a form of a diagonal matrix.

33. (previously presented) The system of claim 1, wherein output data is collected from the neural network, and a two-dimensional map of the output data is displayed.

34. (previously presented) The system of claim 1, wherein output data is collected from

the neural network, and a plurality of two-dimensional maps of the output data are displayed.

35. (previously presented) The system of claim 1, wherein the lower-dimension representation is a three-dimensional display.

36. (previously presented) The system of claim 1, wherein the training module performs self-supervised training.

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37. (previously presented) The system of claim 1, wherein the neural network is self-organizing.

38. (previously presented) The system of claim 1, wherein nodes in the other layer are non-linear.

39. (previously presented) The system of claim 1, wherein the other layer comprises an output layer.

40. (previously presented) A method for visualizing multi-dimensional pattern data reduced to a lower-dimension representation, comprising:

providing a neural network having an input layer and an other layer, wherein a number of nodes in the other layer is less than a number of input nodes in the input layer, and the other layer supplies an output signal corresponding to multi-dimensional pattern data received by the input layer; and

training the neural network to equalize and orthogonalize the output signal of the other layer.

41. (previously presented) The method of claim 11, wherein the output signal of the other layer is equalized and orthogonalized by constraining values of a covariance matrix of the output signal.

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42. (previously presented) The method of claim 11, wherein the output signal of the other layer is equalized and orthogonalized by reducing a covariance matrix of the output signal to a form of a diagonal matrix.

43. (previously presented) The method of claim 11 further comprising collecting output data from the neural network, and displaying a two-dimensional map of the output data.

44. (previously presented) The method of claim 11 further comprising collecting output data from the neural network, and displaying a plurality of two-dimensional maps of the output data.

45. (previously presented) The method of claim 11, wherein the lower-dimension representation is a three-dimensional display.

46. (previously presented) The method of claim 11, wherein the training is self-supervised training.

47. (previously presented) A computer system, comprising:

a processor; and

a program storage device readable by the computer system, tangibly embodying a program of instructions executable by the processor to perform the method claimed in claim 40.

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48. (previously presented) A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform the method claimed in claim 40.

49. (previously presented) A computer data signal transmitted in one or more segments in a transmission medium which embodies instructions executable by a computer to perform the method claimed in claim 40.